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## Quality 4.0: A Digital Quality Assessment of CO-MARKET Intelligent App for Coconut and Sarakat Products



**Abstract:** - The coconut, which is sometimes referred to as the "tree of life," has long been an important agricultural commodity in the Philippines. It provides various products, maintains livelihoods, and makes a substantial economic contribution to the nation. However, the coconut business has numerous difficulties that have an impact on production and the lives of coconut farmers, despite its cultural and economic significance. Within in this context, our study focused on the design and development of Co-Market Intelligent App for promoting coconut and sarakat products. This research also aimed to evaluate the app's effectiveness as a digital tool for marketing. We carried out a thorough analysis that included user responses and a systematic quality assessment utilizing the developed USE Questionnaire in order to gauge the effectiveness of the Co-Market Intelligent App. Findings reveal a strong positive perception among users, with a significant proportion expressing satisfaction with the app's usefulness, ease of use, and ease of learning. With 43% of respondents strongly agreeing and an additional 40% agreeing on the app's usefulness, it's evident that users find significant value in its features and functionalities for facilitating transactions within the coconut and sarakat market. Furthermore, the app is more beneficial as a digital marketing tool due to its user-friendly interface and compliance with ISO 25010 Software Quality Standards' Usability component. Recommendations derived from the research findings provide a roadmap for future enhancements, aiming to elevate the Co-Market App's effectiveness and solidify its position as a leading digital tool in agricultural technology. Finally, this research offers practical recommendations for developers, policymakers, and stakeholders seeking to leverage technology for enhancing agricultural commerce and fostering inclusive economic growth.

**Keywords:** CO-MARKET, Intelligent App, Usability, Coconut Products, Sarakat Products, ISO 25010, Digital Marketing

### I. INTRODUCTION

The coconut (*Cocos nucifera*), sometimes referred to as the "tree of life," is grown in more than 90 countries, mostly in South America, Asia, and the Pacific Islands. At the moment, Indonesia, India, and the Philippines are the main producers of coconuts, accounting for more than 75% of the crop produced worldwide [1]. Moreover, (*Pandanus spp.*) is a plant species commonly known as the "screw pine" or "pandan" and it is locally known as "sarakat" in Northwestern Cagayan. The sarakat plant is high valued by indigenous populations due to its various uses. The leaves are extensively utilized in the weaving of mats, baskets, caps, and other traditional crafts.

However, due to a variety of local and foreign marketing issues as well as prevailing or changing conditions, the market has recently decreased and has been continuously threatened. Innovative technology is not used in the Philippines' coconut producing processes and marketing techniques [2]. The pricing and marketability of coconut and its byproducts, as well as those of sarakat and its byproducts, affect the farmers' and weavers' financial standing. Among the plantation crops, the coconut and sarakat are important for meeting the sociocultural demands of our community as well as having grown significantly in importance in the national economy as a possible source of employment and revenue production in rural areas. In the context of the liberalized trade policy, it is also necessary to address the opportunities and problems presented by the global markets. The supply chains for coconuts in the Philippines are complex and multi-layered, stretching from the site of production to both the local and foreign markets, according to [3]. It was discovered that the farmers lacked the technical and commercial acumen required to manage the coconut farms. Additionally, they discovered that little information sharing between supplier chains and those further down the chain resulted in expensive marketing expenses.

The study presented here centers on a game-changing tool called "CO-MARKET Intelligent App" which was created especially to deal with these aforementioned challenges and issues of coconut farmers and sarakat weavers. CO-MARKET Intelligent App is a web-based shopping system for coconut farmers and producers likewise with women sarakat weavers intended solely for marketing and advertising. The main goal of this intelligent app is to provide coconut farmers and sarakat weavers together with consumers a physical store access to the advantage of internet shopping. Customers may explore a variety of items that the farmer and weaver shops' offer with the aid of this web app, and they can stay updated on the status of their orders in real time. Furthermore, this app will make it simple for administrators to view orders that have been placed and for the business owner to quickly administer the system. In view of the fiercely competitive global market, the system business was designed to fortify and greatly expand the coconut and sarakat marketing area.

The studies of [4] and [5], highlighted that innovation can be an effective technique for generating growth and increasing performance in smaller enterprises. Since smaller businesses typically have fewer resources and are up

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against more competition, innovation can help them stand out from the competition and gain an advantage [4]. Moreover, [6] research findings suggest that the influence of digital marketing innovation on firm performance via marketing competence may be especially important for small and medium-sized enterprises (SMEs). SMEs frequently have lower resources and have greater obstacles in adopting and implementing digital marketing tactics than bigger corporations. However, digital marketing innovation may provide SMEs with new ways to strengthen their marketing skills and increase their competitiveness. SMEs may increase their marketing skills by investing in digital marketing innovation [7], as well as reach and connect with customers more effectively via different digital platforms. This can result in higher client satisfaction, loyalty, and revenue, eventually enhancing business profitability.

On the other hand, there are three main factors of how supply chain specifically purchasing intention of consumers in the realm of digital platforms [8]. These are User Interface (UI), User Experience (UX) and Digital marketing. According to [9], there has been ongoing speculation that effective design has the potential to influence individuals' purchase intentions. This suggests that the likelihood of purchase intention is influenced by factors such as a well-crafted user interface (UI), which encompasses elements like visual design, micro-interactions, and design layout. In addition, users are likely to stop using the app, other digital product or website if the user experience does not fulfill their expectations. Feeling uncomfortable while using the product can lead to immediate dissatisfaction. In essence, a positive website or app experience can make the product stand out, encouraging users to explore further and potentially increasing their inclination to make a purchase [10]. In addition, digital marketing is recognized as an innovative approach to business promotion, offering companies novel opportunities to engage with their target audiences. By leveraging digital channels, marketers can swiftly connect with potential customers, irrespective of geographical boundaries. It includes a range of tactics including campaign advertising, blogger marketing, social media promotion, optimization for search engines, content marketing, e-commerce marketing, content automation, and display marketing [11].

The study of [12] was based on marketing topics in the context of Industry 4.0 and its implications. They defined innovative marketing as the pursuit of creative and original answers to problems and requirements. In order to enhance their competitiveness and boost productivity, companies need to consistently create novel products and tactics.

So, the main goal of this research is to conceive and develop a CO-MARKET Intelligent App tailored for the promotion and economic advancement of coconut farmers, producers, and sarakat weavers in Northwestern Cagayan. In addition, we also sought to evaluate the app's usability and effectiveness in influencing the marketing strategies associated with coconut and sarakat products, thereby contributing to the economic prosperity of the aforementioned stakeholders.

To achieve these objectives, we adopted a comprehensive research approach. Firstly, we considered Agile Software Development Workflow diagram as shown in Figure 1 and gone throughout the whole process to come up with the CO-MARKET Intelligent App. Secondly, we conducted a thorough quality assessment using the USE Questionnaire (Usefulness, Ease of Learning, Ease of Use, and Satisfaction), developed by Lund A.M. in 2001 [13] which is aligned with ISO 25010 Quality Standards. This instrument provided a robust framework for evaluating both the utility of the system and user satisfaction, offering valuable insights into the app's performance from a user perspective. By leveraging established industry benchmarks, we aimed to gain a deeper understanding of the app's usability and identify areas for enhancement, thus ensuring its efficacy as a digital marketing tool.

In essence, this research sheds light on the potential of the CO-MARKET Intelligent App as a reliable and user-friendly platform for facilitating the marketing and distribution of coconut and sarakat products. By engaging farmers, weavers, producers, and consumers as primary users of the app, our findings aim to underscore the significance of introducing technology innovation to foster economic growth and sustainability within local agricultural and communities engaged in craft products.

This study opens the door for a wider use of digital tools in coconut and sarakat farming as well as in the marketing and advertising of coconut and sarakat products by creating and showcasing the effectiveness of the CO-MARKET Intelligent App. It is expected that this industry will undergo a paradigm shift, with well-informed decision-making supported by advanced digital marketing tools. This shift aims to promote a sustainable marketing strategy that benefits farmers and society at large, and in addition, to strengthened the supply chain of coconut and sarakat products in the market [14].

## II. METHODOLOGY

In this study, both developmental research approach and a quantitative research approach were employed to develop and evaluate the "CO-MARKET Intelligent App", respectively. Researchers used Agile methodology for the development and USE Questionnaire created by Lund A.M. in 2001, a validated instrument designed to measure four key aspects: Usefulness, Ease of Learning, Ease of Use, and Satisfaction.

### *2.1 Developmental Research Approach*

A framework known as the Software Development Life Cycle (SDLC) outlines the steps an organization takes to create an application from the beginning to the end of its life cycle [15][16]. The Agile approach to software

development, according to [17], emphasizes flexibility, collaboration, and adaptability to deliver high-quality products that meet evolving customer needs. Moreover, agile methodologies are a way of thinking about how to use organizational models that are built on shared values and teamwork in order to achieve customer satisfaction through quick iterations that result in deliverables that show you how developments are going from the first phase [18].

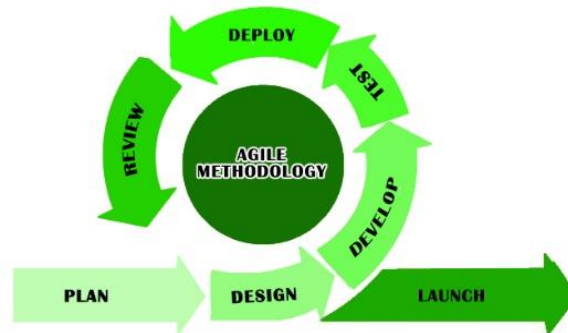


Figure 1. Agile Software Development Workflow Diagram of the Study.

### 2.1.1 Plan

To begin a project using the agile methodology, very little planning is necessary [19]. Researchers organize their effort using methods like backlog grooming and stories or experiences of farmers. The researchers engaged collaboratively with farmers, producers and weavers to gather requirements and create a development roadmap during this phase.

### 2.1.2 Design

The researchers proceed to the design stage when the plan was established. They converted the acquired requirements during the planning phase into workable design specifications during this step. Below are some of the designs as shown in the following figures.

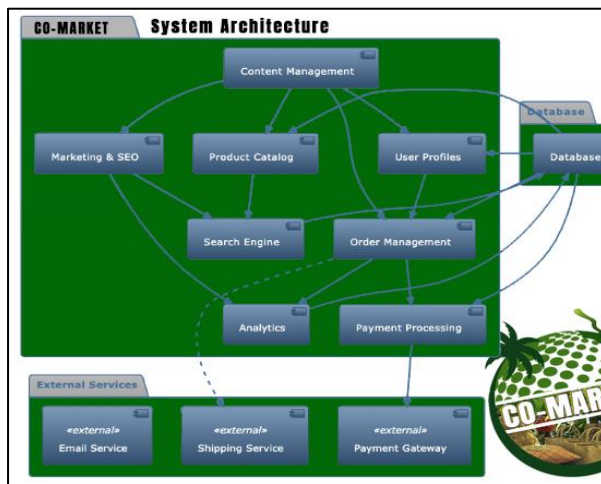


Figure 2. Co-Market Intelligent App System Architecture

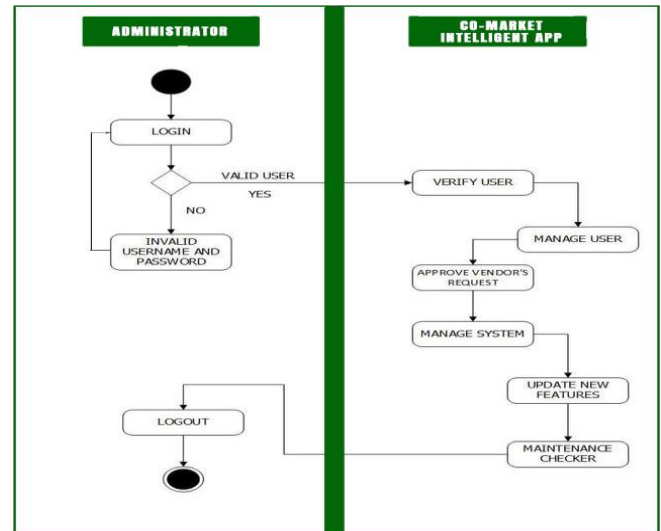


Figure 3. Co-Market Intelligent App Activity Diagram

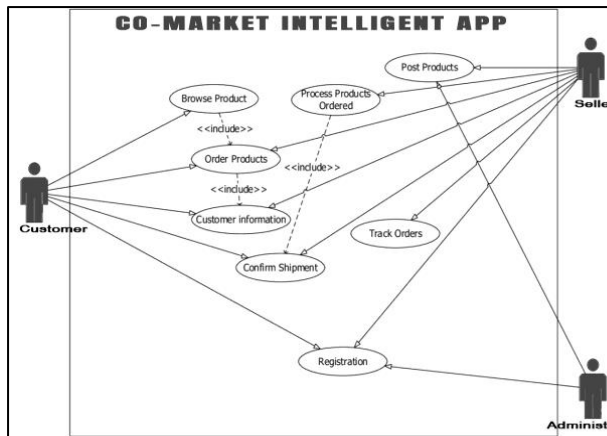


Figure 4. Co-Market Intelligent App Use Case Diagram

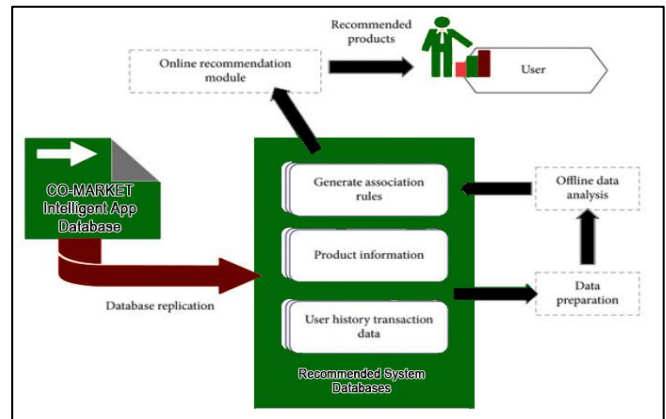


Figure 5. Co-Market Recommender System Diagram

### 2.1.3 Develop

The researchers initiate the development phase after obtaining the design specifications. They write codes, create features, and putting functionality into practice in accordance with the design criteria using native PHP, HTML, Javascript, MySQL and Phython.

### 2.1.4 Test

Agile development requires testing, it is the procedure for confirming that an application satisfies user requirements and is implemented in accordance with all specifications [20]. During this phase, the researchers confirm that every feature satisfies the requirements and performs as planned.

### 2.1.5 Deploy

The researchers proceeded to the deployment stage when development and testing were done. They automate the deployment process and guarantee seamless transitions between development and creation settings, continuous integration and continuous deployment (CI/CD) techniques were frequently used to lessen stage between development [21].

### 2.1.6 Review

In this phase, the researchers gathered the feedback of the users, demonstrations were given, and the product's performance was evaluated against important KPIs. These KPIs are used to assess the degree to which the goals of the app were met [22].

### 2.1.7 Launch

During this stage, the app was made publicly accessible and is formally released to farmers, producers, weavers and consumers for the next aimed of this research which is to assess the extent of usability. The app is accessible through this link <https://comarketph.com/>.

## 2.2 Quantitative Research Approach

When using a quantitative research technique to examine the usability of the CO-MARKET Intelligent App, the USE Questionnaire linked with the ISO 25010 Quality Standard is an effective instrument. This methodological framework enables a systematic assessment of the app's efficacy, efficiency, and user satisfaction across key usability parameters. The USE Questionnaire statistically measures participants' evaluations of the app's usefulness, ease of learning, ease of use, and overall satisfaction, providing objective statistics on the app's usability. Furthermore, by aligning the evaluation with the ISO 25010 Quality Standard, with an emphasis on the Usability component, the research assures adherence to internationally recognized benchmarks, which improves the validity and reliability of the findings.

This quantitative research approach helps make well-informed decisions for iterative upgrades and enhancements to maximize user experience. It also provides insightful information about the usability of the CO-MARKET Intelligent App.

## III. RESULTS AND DISCUSSIONS

This section of our research is dedicated to present the findings derived from our extensive development and evaluation process of the CO-MARKET Intelligent App. Grounded in a developmental and quantitative research methodology, our app development approach is anchored in agile approach, the process by which a company aligns its practices with the characteristics of the technology that will be put into use [23]. Our analysis encompasses a comprehensive assessment utilizing the USE Questionnaire, which delves into various aspects including usefulness,

ease of use, ease of learning, and overall satisfaction among users to measure the subjective usability of the app [24].

### 3.1 Developed CO-MARKET Intelligent App

The CO-MARKET Intelligent App is a smart blend of technical capability and intuitive design, carefully crafted to meet the different demands of coconut farmers, producers, sarakat weavers, and consumers. Using cutting-edge technologies, the app seamlessly integrates functionalities such as product listings, search capabilities, individual profiles, conditional logic chatbot, market basket analysis, and transaction processing. Its clean and user-friendly graphical interfaces provide an immersive experience, allowing users of all demographics and technological levels to navigate and interact with ease.

The figures presented below offer a visual depiction of the CO-MARKET Intelligent App, serving as the primary interface through which users interact with our groundbreaking digital marketing and advertising innovation showcasing its pivotal role in revolutionizing the way coconut farmers, producers, sarakat weavers, and consumers engage with the market landscape.

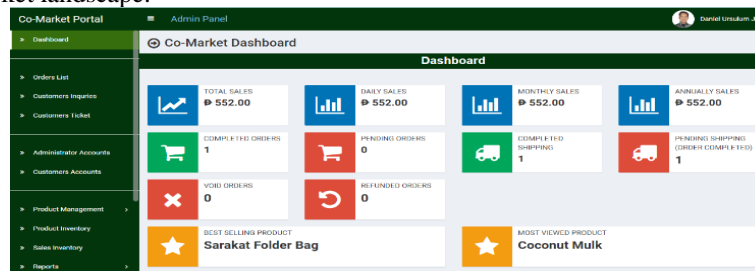


Figure 6. Administrator/Merchant Dashboard

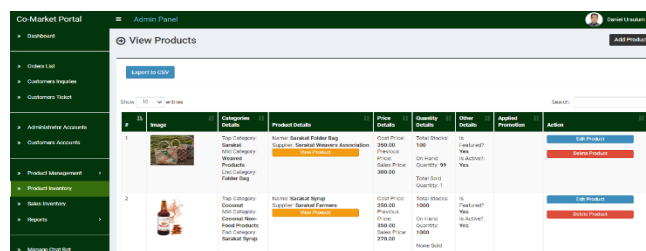


Figure 7. Manage Product and Inventory

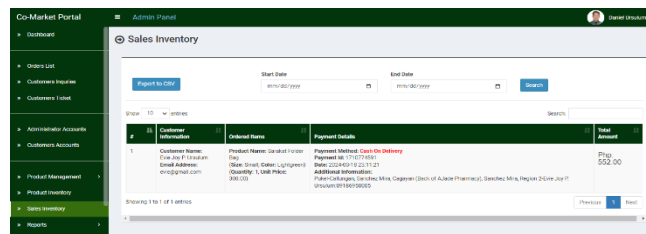


Figure 8. Sales Inventory

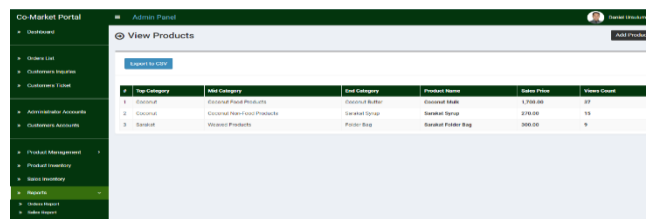


Figure 9. Trending Product Report

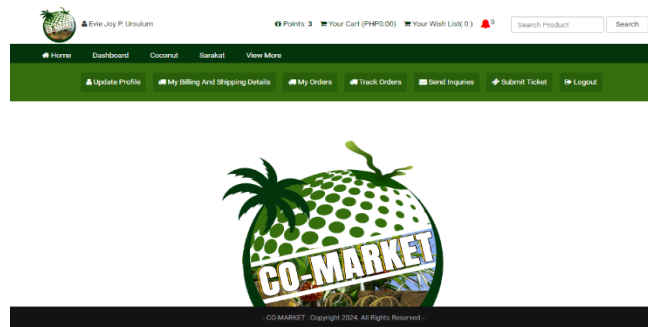


Figure 10. Customer Dashboard

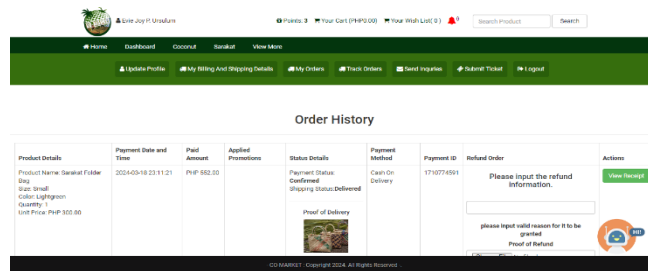


Figure 11. Customer Order List

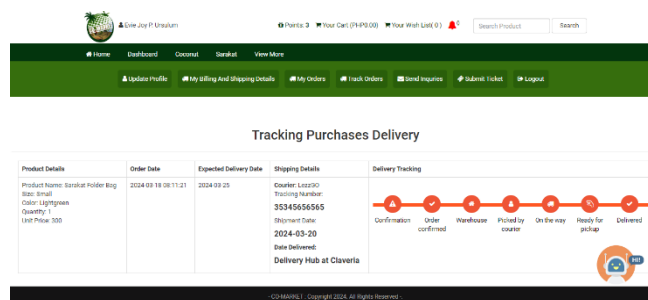


Figure 12. Customer Track Order

### 3.2 Usability Assessment using USE Questionnaire aligned with ISO 25010

In the rapidly changing world of digital market, assessing the impact and effectiveness of marketing and advertising innovation is critical for driving constant advancement and assuring satisfaction for consumers. The industry's increased competitiveness as well as the change in consumers' purchasing and shopping habits are mostly the result of technological improvements [25]. Thus, this study evaluates the "CO-MARKET Intelligent App," an innovative platform designed to help farmers, producers, and sarakat weavers promote and advertise their products while also meeting customer needs.

Our inquiry takes a multidimensional method, building on a strong quantitative research framework and utilizing Lund A.M.'s USE Questionnaire. (2001). This section methodically provides the findings and discusses their broader implications, shedding light on crucial areas such as system usability and the CO-MARKET Intelligent App's efficacy in carrying out its intended applications.

The results are organized to initially present a comprehensive overview of the demographic profiles of the study participants. This includes the distribution across age groups, gender, educational backgrounds, and frequency of using technology in selling and buying products.

This demographic analysis provides the foundation for understanding the experiences and perspectives of the participants interacted with the Co-Market App. Then, we examine the primary findings derived from the USE Questionnaire, including insights into usefulness, ease of learning, ease of use, and overall satisfaction. Finally, we interpret these findings in the discussion in light of the larger picture of promoting and marketing coconut and sarakat products using Co-Market App. In addition to discussing the implications of these findings for the platform's future development and uptake, we also look at how various demographic aspects may affect user experience and satisfaction.

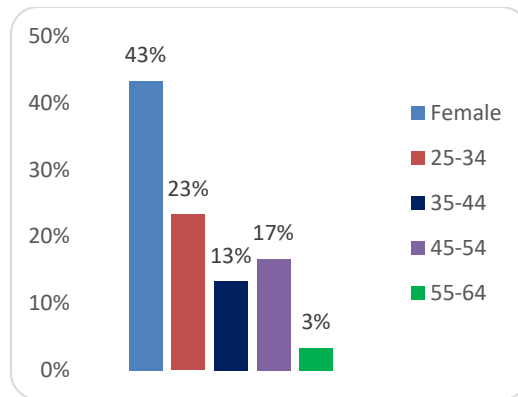


Figure 13: Percentage Distribution of Participants by Age Group

As shown in Figure 13, it resulted to skewed percentages towards 18-24 age group. The significant percentage (43%) of individuals aged 18-24 suggests that this age group is likely more active in adopting new technologies, including web apps. They are more inclined to explore and evaluate new apps like CO-MARKET App. The subsequent significant age group consisted of individuals aged 25–34, comprising 23% of the sample, and 45–54, representing 17%. The market trends are responsible for this. Certain age groups may be more involved or interested in topics relating to coconut and sarakat products, depending on market trends. The demographics of the intended market for these products may be reflected in the participants' distribution across age groups. With 13% of individuals, the 35–44 age group also accounted for a sizeable share of the user base, indicating the platform's usefulness to programmers, web developers, and IT experts who want to assess the Co-Market App's overall performance. Considering all factors, these age groups gave us an understanding of the main user bases of Co-Market Web App and could potentially assist us develop more focused platform improvements and marketing plans.

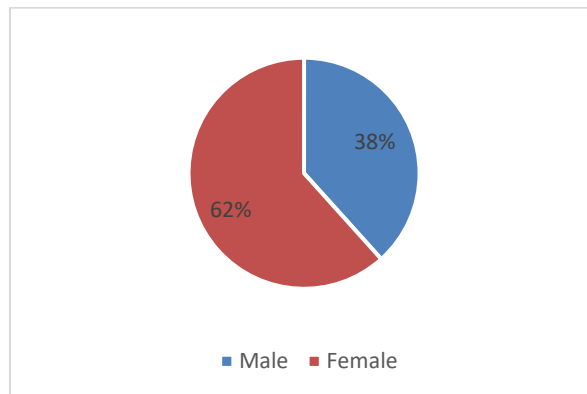


Figure 14: Percentage Distribution of Respondents Gender

With 62% of females and 38% of males showing interest in the Co-Market Intelligent App for coconut and sarakat products, there could be various reasons for this gender disparity in interest (see Figure 14). One potential reason why females might show more interest in the Co-Market Intelligent App for coconut and sarakat products could be related to their consumer preferences and decision-making capability. Females may generally be more interested in health and wellness products, including those derived from natural ingredients like coconut. If the app emphasizes the health benefits or uses of these products, it may resonate more strongly with female users who prioritize wellness. This reasoning suggests that the app's focus on coconut and sarakat products aligns well with preferences or concerns that are typically associated with female consumers. Understanding and catering to these preferences through targeted marketing, product features, or content could contribute to higher interest and engagement among female users.



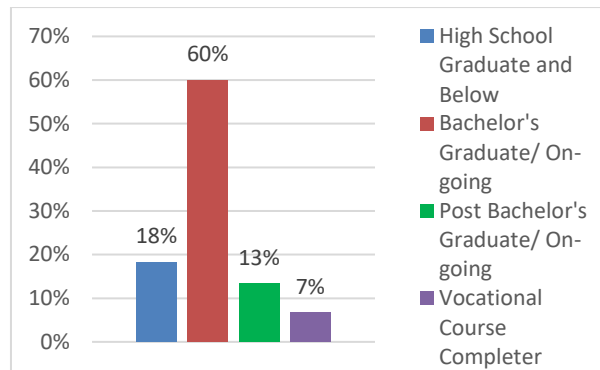


Figure 15. Educational Background of Respondents

The study participants' educational backgrounds (refer to Figure 15) demonstrated a wide variety of academic accomplishments. A substantial majority of 60% had a bachelor's degree, suggesting that most Co-Market Intelligent App users had completed or taking up higher education. This frequency indicates that the platform is especially effectively-liked by people who have a strong educational background, which may have an impact on how well they use the app. Thirteen percent (13%) of the participants had graduate degrees or on going, highlighting the platform's attraction to a more educated population. Eighteen percent (18%) of the participants were high school graduates or below, indicating that even people with less formal education will still be benefit from the app. Lastly, it's interesting to note that 7% of participants had vocational experience, suggesting that Co-Market App was also effectively thumbs up by people with specific hands-on training, perhaps in technology, agriculture or marketing. The respondents' wide range of educational backgrounds demonstrated Co-Market App's universal appeal and suggested that it is applicable to a variety of educational contexts.



Figure 16. Distribution of Respondents

A testament to the platform's widespread appeal was the occupational varied backgrounds of the research participants in Co-Market App evaluation. Due to the fact that students, particularly those in higher education, usually have easy access to smartphones and are accustomed to utilizing multiple applications for both personal and academic purposes, students make up the majority of participants in the Co-Market App evaluation. Both the coconut farmer and the online seller, each have 8 participants, have a vested interest in evaluating the CO-Market app due to its potential impact on their respective businesses. As stakeholders in the agricultural industry, they may share common concerns such as market accessibility, pricing transparency, and ease of use. Technology and software evaluation are areas of expertise for the IT faculty instructor. Their knowledge of functionality, interface design, and user experience can offer important insights on the technical and usability elements of the app. Employees of Local Government Units (LGUs), especially those skilled in programming, can provide important insights into how well the app complies with laws and government programs. Additionally, by including Sarakat Weaver, Business Owner, Trade Industry Development Specialist and Marketing/Sales representative, the evaluation process becomes comprehensive, encompassing technical, industry-specific, commercial, and regulatory perspectives, thus increasing the likelihood of developing a robust and inclusive CO-Market app.



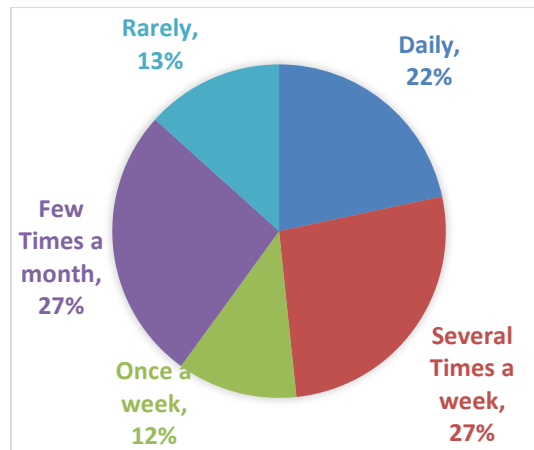


Figure 17. Frequency Distribution of Technology Use in Selling and Buying Products

Figure 17 illustrates the frequency of technology usage in selling and buying products among the respondents. This several times a week category having the highest percentage of 27% indicates their frequent interactions with technology suggest a high level of comfort and proficiency in navigating online platforms to conduct transactions. Daily users with 22% make up a sizable share of the online market, indicating a significant preference for the accessibility and convenience provided by digital platforms. Everyday users could include buyers who shop online because it's more convenient and sellers who run their companies mostly through e-commerce platforms. Overall, these figures show how different buyers and sellers' online transaction habits and preferences are. Although a sizable percentage of people use technology to purchase and sell goods online many times a week or every day, there are still populations that participate less or prefer other means of doing business. Businesses and governments must comprehend these usage patterns in order to effectively customize their strategies and services to fit the needs of various consumer segments.

The results of the USE questionnaire, shown in Table 1, offer valuable insights into the general usefulness, ease of use, and ease of learning and satisfaction of Co-Market App.

The overwhelmingly positive perception of respondents towards the CO-Market App, as evidenced by the high percentages of "Strongly Agree" and "Agree" responses across multiple dimensions, highlights its effectiveness and user-friendliness. With 43% of respondents strongly agreeing and an additional 40% agreeing on the app's usefulness, it's evident that users find significant value in its features and functionalities for facilitating transactions within the coconut and sarakat market. This high level of perceived usefulness suggests that the Co-Market App effectively addresses the needs and requirements of its users, providing them with tangible benefits and enhancing their overall experience in buying and selling coconut and sarakat products.

RESPONSES	Overall Level of Perception of the Participants to Co-Market App			
	USEFULNESS %	EASE OF USE %	EASE OF LEARNING %	SATISFACTION %
Strongly Agree	43%	42%	43%	43%
Agree	40%	37%	40%	35%
Neutral	15%	17%	14%	19%
Disagree	2%	3%	1%	1%
Strongly Disagree	0%	1%	2%	1%

Table 1. Overall Level of Perception of Participants to Co-Market App

Moreover, the promising responses regarding the ease of use, ease of learning, and satisfaction further reinforce the app's positive reception among respondents. With 42% strongly agreeing and 37% agreeing on its ease of use, and 43% strongly agreeing and 40% agreeing on its ease of learning, it's clear that users find the app intuitive and accessible, even for those who may be less technologically savvy. These findings from the USE Questionnaire indicate that the Co-Market App not only fulfills its intended purpose effectively but also resonates with users, fostering trust and loyalty towards the platform.

#### IV. CONCLUSIONS

The evaluation of "Co-Market App" has involved a thorough investigation into the usefulness and user experience of the digital platform, yielding important findings that are essential to comprehending its influence on marketing and promoting coconut and sarakat products. The research revealed numerous significant features of the app, such as its usability, user satisfaction, and appeal to a wide range of demographics, through the methodical application of the USE Questionnaire in conjunction with a comprehensive demographic analysis.

The evaluation of the Co-Market App's demographics offers insightful observations about the user base and their engagement with the platform. Firstly, the significant proportion of individuals aged 18-24, comprising 43% of the participants, highlights the app's appeal to younger demographics. This age group is often characterized by their familiarity with technology and willingness to adopt new digital solutions, suggesting that the CO-Market App effectively resonates with the preferences and behaviors of this tech-savvy generation. Their enthusiastic participation in the evaluation process underscores their interest in leveraging digital platforms for coconut and sarakat product transactions, potentially indicating a promising market segment for the app's future growth and adoption.

Secondly, the substantial majority of participants, accounting for 60%, holding a bachelor's degree underscores the app's appeal among individuals with higher levels of education. This demographic trend suggests that the CO-Market App attracts users who possess analytical skills, critical thinking abilities, and a propensity for technological innovation. Their educational background likely influences their perception of the app's usefulness, ease of use, and satisfaction, contributing to the positive evaluation results observed across various dimensions.

Thirdly, the gender disparity in interest, with 62% of females and 38% of males showing interest in the CO-Market Intelligent App for coconut and sarakat products, prompts consideration of various factors influencing this phenomenon. While further research may be needed to ascertain the exact reasons behind this trend, potential factors could include differences in purchasing behavior, cultural norms, or varying levels of exposure to digital technologies. Understanding these gender dynamics is crucial for app developers and marketers to tailor their strategies effectively, ensuring inclusivity and accessibility for all potential users.

In terms of recommendations for enhancing the CO-Market App's functionality and user experience, integration of third-party services for order payment and delivery management should be fulfilled to streamline the transaction process. Secondly, participants recommended deploying and commercializing the app more extensively to reach a wider user base and maximize its potential benefits. Thirdly, they emphasized the importance of deploying vigorous security measures to safeguard user information, given the app's web-based nature. Additionally, participants highlighted the need for improving the app's user interface design to enhance usability and aesthetic appeal. Lastly, they suggested incorporating mapping/tracing features to identify stakeholders and merchants within the platform, thereby fostering greater interaction and facilitating business transactions between users. These recommendations collectively aim to refine the CO-Market App, making it more efficient, secure, and user-friendly while expanding its capabilities to better serve its target audience.

The research highlights the vital need of giving accessibility and inclusivity a priority while designing the Co-Market App. The platform's usability may be greatly enhanced, increasing its appeal to a wide range of users within the community, by incorporating inclusive design principles and making sure it stays accessible to people with different abilities. These conclusions from the study provide insightful guidance for future improvements that will hopefully improve the Co-Market App's efficacy and position it as the industry's best digital solution for marketing and promoting coconut and sarakat products.

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